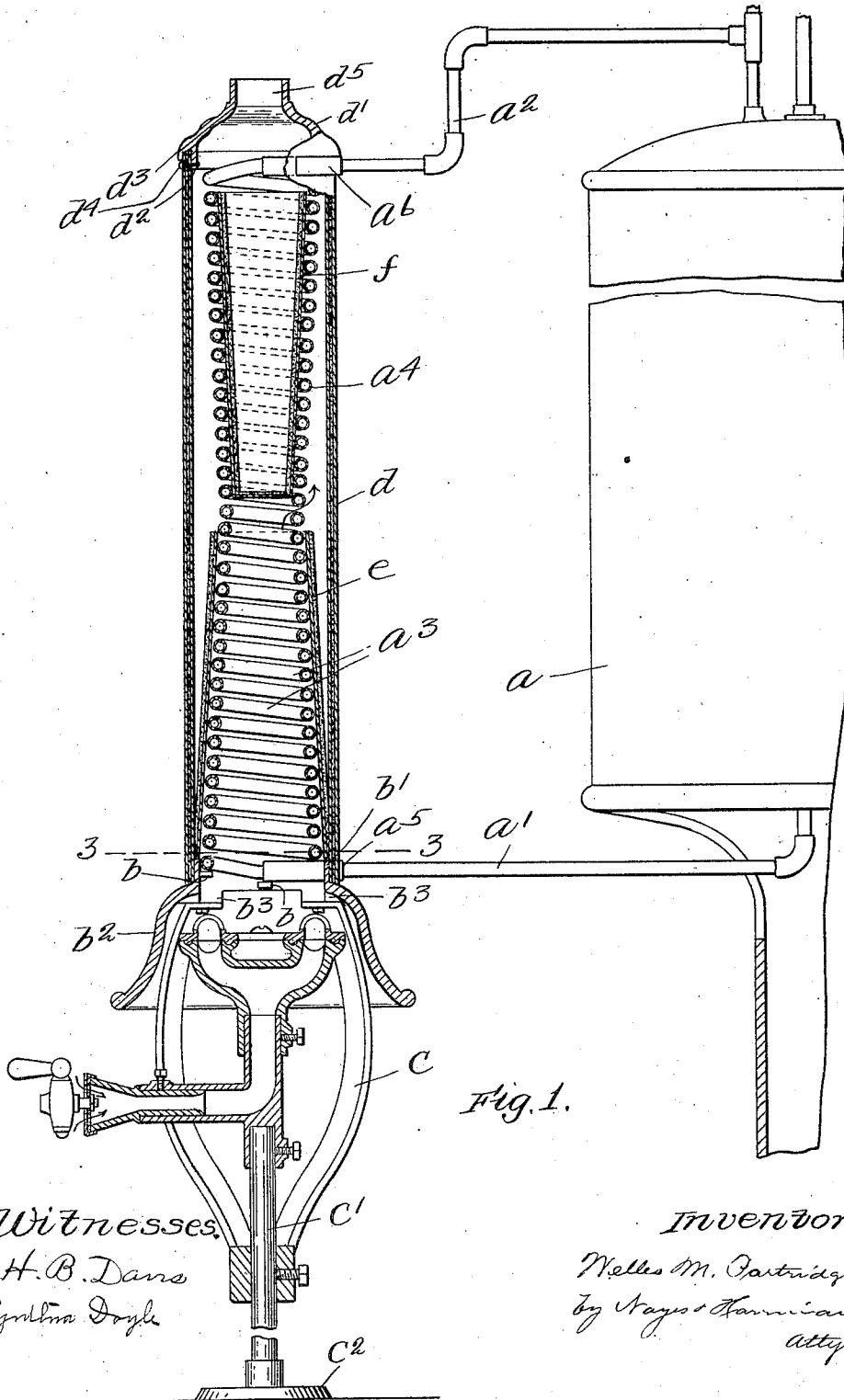


W. M. PARTRIDGE.
WATER HEATING APPARATUS.
APPLICATION FILED APR. 22, 1911.

1,049,524.

Patented Jan. 7, 1913.

2 SHEETS—SHEET 1.

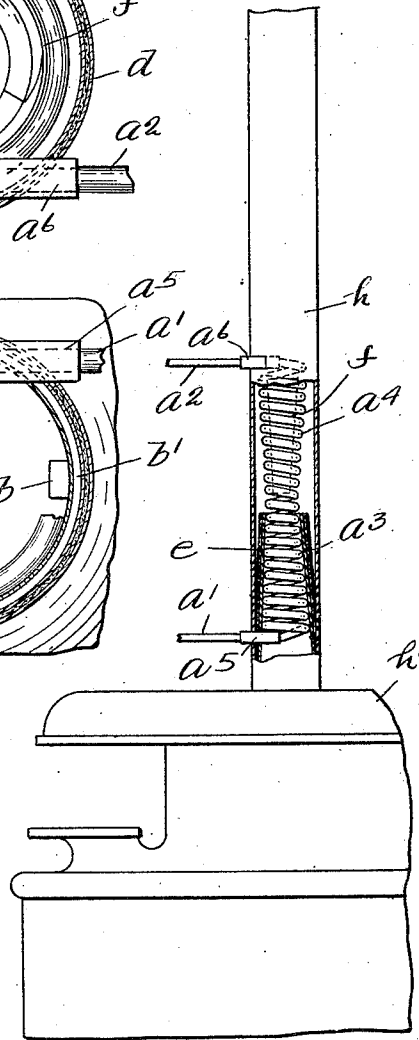
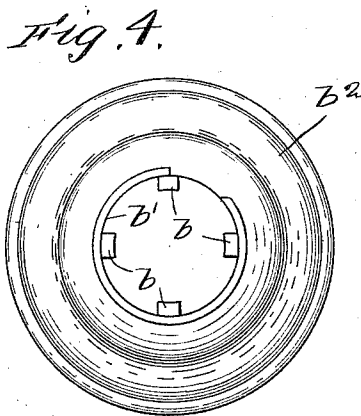
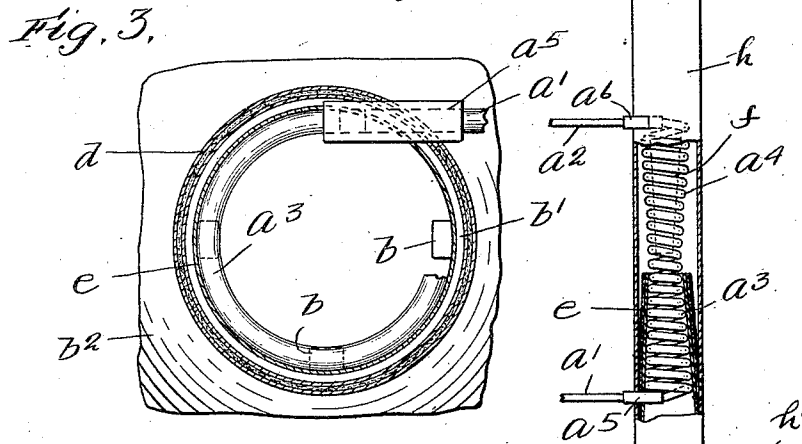
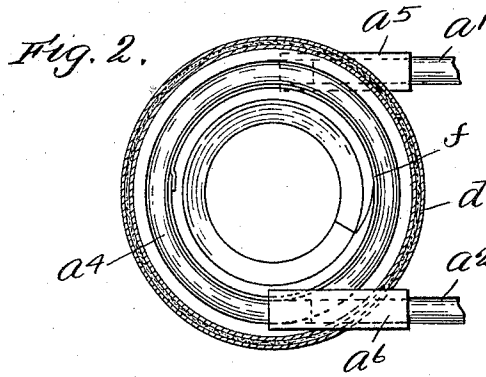


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2 SHEETS—SHEET 2.



Witnesses:
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Inventor:
Welles M. Partridge
by Wages & Harrison
Attys.

UNITED STATES PATENT OFFICE.

WELLES MORTIMER PARTRIDGE, OF MARBLEHEAD, MASSACHUSETTS.

WATER-HEATING APPARATUS.

1,049,524.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Original application filed November 8, 1909, Serial No. 526,728. Divided and this application filed April 22, 1911. Serial No. 622,676.

To all whom it may concern:

Be it known that I, WELLES M. PARTRIDGE, a citizen of the United States, residing at Marblehead, in the county of Essex and State of Massachusetts, have invented an Improvement in Water-Heating Apparatus, of which the following is a specification.

This invention relates to water-heating devices for small boilers and the like, and is a division of my application Serial #526,728, filed Nov. 8, 1909; and has for its object to construct a heating-coil of improved form, provided with means for confining the heat in intimate contact therewith, whereby a very efficient apparatus is produced, which is compact and easy to construct and install; and the invention also has for its object improvements in the construction of the apparatus, as will be hereinafter pointed out.

Figure 1 is a vertical section of a water-heating apparatus embodying this invention. Fig. 2 is a plan view of the water-heating apparatus, the top of the cylinder being removed. Fig. 3 is a horizontal section of same taken on the dotted line 4-4 Fig. 1. Fig. 4 is a plan view of the ring which is provided at the base of the heating-coil. Fig. 5 is a modification to be referred to.

a represents a boiler of any suitable size and construction; *a'* a pipe leading therefrom to the lower end of a heating-coil, and *a''* a pipe leading thereto from the upper end of said heating-coil. The heating-coil is composed of pipe, bent or coiled to form two conical frustums, arranged one above the other, with their smaller ends adjoining, *a'''* representing the lower conical frustum, and *a''''* the upper conical frustum. The coil may comprise one or more pieces of pipe, but is continuous from end to end. The lower end of the lower conical frustum is connected by a coupling *a'''''* with the pipe *a'*, and the upper conical frustum is connected by a coupling *a''''''* with the pipe *a''*. Said couplings are here shown as quadrangular in cross-section to substantially fill recesses formed in the castings through which they pass, but they may be of any other shape. The heating-coil rests on lugs *b* extended inwardly from a ring *b'*, which has at its lower end a bell-shaped extension *b''*. Said ring also has on its under side the lugs *b'''*, adapted to rest upon and be connected with the upper ends of supporting-arms *c*, any desired number being employed, which are adjustably con-

nected at their lower ends to an upright post *c'*, rising from a suitable base *c''*. The ring *b'* and lugs thereon and bell-shaped extension are preferably, but not necessarily, cast in a single piece. The heating-coil is contained in a cylindrical case *d*. Said case is fitted over the ring *b'* and rests on top of the extension *b''*, and extends up to a point above the top of the coil, and it is open at each end, and at the top has fitted into and upon it a cap *d'*. Said cap has a flange *d''* which extends down into the case, and a flange *d'''* which extends over upon the outside of the case, so that the upper edge of the case enters the space formed between the flanges *d''* and *d'''*. Said cap is secured to the case by screws *d''''* or otherwise. Said cap has a center-hole *d'''''* through it of any suitable size. Said case, as here shown, consists of two concentrically arranged metallic cylinders disposed with a space between them containing insulating or non-heat conducting material.

The lower part of the heating-coil or conical frustum *a'''* is inclosed by a shield *e* of frusto-conical form, corresponding to the shape of the portion of the heating-coil which it incloses. Said frusto-conical shield extends from the ring *b'* on which it rests to near the upper end of the lower conical frustum, and it is preferably made to engage the heating-coil, as shown, but it may be arranged more or less removed therefrom, if desired. The upper part of the heating-coil or conical frustum *a''''* has arranged within it a shield *f* of a conical form, which extends from the top of the heating-coil downward to a point near the lower end of the upper conical frustum. Said shield *f* is placed in the conical frustum and is preferably supported by it. The frusto-conical shield *f* is or may be made imperforate.

The shield *e*, as here shown, is composed of a metallic inner-wall which is covered externally with an insulating or non-heat-conducting material, and the shield *f*, as here shown, is composed of a metallic outer-wall which is lined with insulating or non-heating-conducting material, and the metallic walls of said shields serve as deflectors for the heat. The heat which passes up through the lower conical frustum is confined by the frusto-conical shield *e*, thereby to heat the lower part of the heating-coil, and it then passes out between the coils into the case *d*, at the upper end of said shield *e*,

and is confined between the walls of the case and the shield *f*, thereby heating the upper part of the heating-coil. The imperforate shield *f* acts as a deflector to cause the heat to engage all the coils of the upper conical frustum, and to cause the heat to pass up on the outside of said upper conical frustum.

It will be seen that the heat passes upward on the inside of the lower part of the heating-coil and on the outside of the upper part of the heating-coil. By reason of the conical formation of the two parts of the heating-coil, when constructed as here shown, the heat will directly engage each and every coil thereof as it passes upward. By making the heating-coil in two conical frustums, as shown, and arranging the shields on the outside of one and on the inside of the other, the water passing through the heating-coil is very quickly heated. The coupling *a*⁶ extends through a hole made in the case *d* and flange *d*² on the cap *d'*, and the coupling *a*³ extends through a like hole made in the case *d* and ring *b'*, the shape of the couplings corresponding to the shape of the holes.

As shown in Fig. 1, the heating-coil is arranged above a gas-burner *g* of any suitable construction, which is located inside of the bell-shaped extension, and which is adjustably supported on the upright post *c'*, and adapted to be supplied with mixed air and gas by any suitable means.

In Fig. 5 the heating-coil is arranged in a stove-pipe *h*, connected in ordinary manner to a stove or range *h'*, and the heat passes up through it in the same manner as shown in Fig. 1.

I claim:

1. In a water-heating apparatus, a heating-coil adapted to be connected with a boiler, made in the form of two conical frustums, arranged one above the other, with their smaller ends adjoining, a case containing said coil, open at each end, and an imperforate frusto-conical shield, arranged in the upper conical frustum of the heating-coil, substantially as described.

2. In a water-heating apparatus, a heating-coil adapted to be connected with a boiler, made in the form of two conical frustums, arranged one above the other, with their smaller ends adjoining, a case containing said coil, open at each end, and an imperforate frusto-conical shield arranged within the upper conical frustum of the heating-coil and composed of a metallic outer wall and a lining of insulating material, substantially as described.

3. In a water-heating apparatus, a heating-coil adapted to be connected with a boiler, made in the form of two conical frustums, arranged one above the other, with their smaller ends adjoining, a case containing said coil, open at each end, a frusto-conical shield inclosing the lower conical frustum of the heating-coil, and an imperforate frusto-conical shield arranged in the upper conical frustum of the heating-coil, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WELLES MORTIMER PARTRIDGE.

Witnesses:

RICHARD R. RICHARDSON,
HENRY B. DAVIS.